Original Communication

Lessons Learnt About Conducting a Multilingual Nutrition Survey in Switzerland: Results from menuCH Pilot Survey

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Abstract: This paper informs about the implementation of the first trilingual Swiss nutrition pilot survey and lessons learnt in terms of recruitment, participation, data collection feasibility, and data management. The population-based cross-sectional nutrition pilot survey took place between June and November 2013. Six trained dietitians interviewed 276 adults aged 18-75 years residing in the cantons of Bern (German), Vaud (French) or Ticino (Italian). Food consumption was assessed with two non-consecutive computer-assisted 24-Hour Dietary Recalls (24HDR), applying a trilingual version of GloboDiet® adapted to specific requirements of Switzerland. The first interview was face-to-face and included anthropometric measurements while the second was by phone. Quality controls consisted mainly in the descriptive analysis of data at food level, and the observation and rating of 21 interviews (4%) by coordinators. Net participation rate was 29%. Participants and non-participants were similar: mean [±SD] age was 49±16 and 47±16 years, and women proportion 49.6% and 49.8%, respectively. Training and data collection proved feasible and deliverable in the six months using the newly developed survey instruments. Dietitians followed the standard operating procedures. Quality controls on food consumption data showed comparable results between face-to-face and phone 24HDR, and across dietitians (median number of reported food items per 24HDR: 27). Procedures to transfer and clean food consumption data were developed. The implementation concept proved applicable in the trilingual Swiss context. Additional resources were planned for increasing participation rate and facilitating data cleaning.

Keywords: National nutrition survey, multilingual pilot survey, anthropometry, food consumption, participation rate, computer-assisted 24-hour dietary recall (GloboDiet®/EPIC-Soft®)

Introduction

So far Switzerland lacked nationally representative information to evaluate food consumption patterns and the country's situation in terms of diet, nutrition and food safety [1, 2]. To fill the gap and comply with European standards, the government initiated in the mid-2000s the planning of the first national nutrition survey. Key elements were to assess food consumption and provide measured anthropometric data of a population-based representative sample of Swiss adult residents.

The Institutes of Social and Preventive Medicine in Lausanne (IUMSP) and Bern (ISPM) in cooperation with Bern University of Applied Sciences (BUAS) were contracted to develop and conduct the first Swiss national nutrition survey – menuCH – on the bases of an open call for tenders by the Food Safety division of the Federal Office of Public Health (FSVO / FOPH)[1].

1 As of 1st January 2014 the Food Safety Division of the Federal Office of Public Health (FOPH) merged with the former Federal Veterinary Office to build the new Federal Food Safety and Veterinary Office (FSVO). To reflect these facts the Abbreviation FSVO / FOPH is used throughout this manuscript.

The tripartite mandate asked for an approved implementation concept as well as the successful completion of a pilot survey prior to the launch of the main survey.

Switzerland had no previous experience in collecting nationally representative food consumption/nutrition data across the major Swiss linguistic regions. The survey had to be developed in three languages (German, French, and Italian) and piloted across these regions. The main objective of the present pilot survey was to test the overall survey organization defined in a specifically established implementation concept. More specifically the trilingual pilot survey aimed at 1) testing recruiter training, recruitment procedures and estimating participation rate, 2) testing data collection practicability using the various survey instruments, 3) examining field dietitians' training and refining quality control measures, as well as 4) establishing applicable data management structures and cleaning procedures using real data. This paper focuses on the lessons learnt from the implementation of this pilot survey.

Methods

The cross-sectional multi-centric pilot survey lasted from June to November 2013. Table 1 shows the survey implementation phases with related tasks/procedures, applied instruments and responsible institutions. Recruitment and interviews with participants were conducted in German, French and Italian whereas the common administrative language was English.

Sampling and recruitment

Target pilot survey sample size was 300 adults living in three cantons and linguistic regions: Bern (mainly German), Vaud (French), and Ticino (Italian). The Federal Statistical Office (FSO) provided a population-based random sample of 1200 individuals aged 18–75 years from the sample frame for person and household surveys, SRPH [3]. Due to the unexpectedly low rate of available phone numbers, this original sample was extended to a total sample of 2016 individuals. Between June and August 2013 every subject was mailed a personal pre-tested invitation letter in German, French, or Italian, announcing a phone call from the central recruitment center (ISPM, CATI-laboratory). The letter included a prepaid response card to indicate contact details and best availability for a call in case of interest to participate. It was directly returned to the recruitment center. The mailing was organized in six waves sent every two weeks. Latest one month after mailing, people with known phone number were called by specifically trained recruitment interviewers using a computer-assisted telephone (CATI)-system. Recruiters explained participation details and informed about compensation payment of CHF 100 to cover participation related expenses. For people who agreed to participate recruiters fixed the first appointment using a survey specific web-based scheduling tool. Refusals were asked to answer a 5-item non-respondent questionnaire (CATI) to allow for comparative characterization of responders and non-responders.

The first interview took place in one of three centrally located study centers in Bern, Lausanne and Lugano; the second interview was conducted by phone two to six weeks later, in general on a different week-day. Interview days were Mondays to Saturdays. Recruiters were instructed to distribute appointments evenly across week-days. However, with no appointments on Sunday, Mondays had to be overrepresented to be able to cover food consumption on either Saturday or Sunday. The scheduling tool served to centrally book appointments, issue confirmation letters and send E-Mail reminders to participants, and to monitor recruitment pace and patterns across centers in real time. Responders were mailed a participant's information sheet, a consent form, a confirmation of appointment, a study center access map and a dietary behavior and physical activity questionnaire.

Data collection procedures

Trained dietitians/nutritionists (field dietitians) conducted two interviews per participant. Key elements were the repeated 24-Hour Dietary Recalls (24HDR) and the realization of objective anthropometric measurements. The structure and timing of the face-to-face interview was established based on European Food Safety Authority's recommendations [4], international health and nutrition survey reports [5, 6] and previous experience from survey investigators. The face-to-face interview was expected to take between 75 and 90 minutes, consisting of six elements: (a) introduction and consent; (b) completeness check of the dietary behavior and physical activity questionnaire; (c) anthropometry; (d) 24HDR (40–60 minutes); (e) schedule of the second phone-administrated 24HDR, and (f) closure. The duration of the phone interview (only elements d and f) was expected to take between 45 and 65 minutes. Table 1 details all applied survey instruments related to data collection.

Table 1. Pilot survey implementation phases with related tasks/procedures, applied instruments and involved institutions.

Phases	Tasks/procedures	Instruments	Institutions
Recruitment	Provide a population-based sample with contact details		FSO
	Invite people to participate	Invitation letter* & response card*	IUMSP, FSVO/FOPH
	Train recruiters	Training program/manual	ISPM
	Recruit participants and fix appointment in a study center	– Computer-assisted telephone interview (CATI)-system – Central web-based scheduling tool* – 5-item non-respondent questionnaire*	ISPM
Data collection	Train dietitians	Training program and survey manual	ISPM, IUMSP, BUAS, FSVO/FOPH
	Apply methods following standard operating procedures (SOP)	– Participant information* & consent form* – GloboDiet® (GD)* & set of household measures + picture book [11]* – 49-item dietary behavior and physical activity questionnaire* – Anthropometric tools & a form to note measured values	Dietitians, IUMSP
Data management	Transfer GD data from field to central data center	FileZilla© – password protected online File Transfer Protocol server	IUMSP
	Enter questionnaire and anthropometric data	Sphinx©* – web-based survey database	Dietitians
	Control, merge and analyze data	– SQL Server Management Studio Express – useful to modify GD files – R – classical statistical software	IUMSP
	Evaluate and clean GD data to inform software updates and to prepare for data linkage	GD* and Microsoft Excel©	BUAS, FSVO/FOPH, IARC
Quality controls	Identify questions or issues from the field (e.g. in survey instruments)	Bi-weekly electronic logbooks	Dietitians, BUAS, IUMSP, ISPM, FSVO/FOPH
	Assess interview quality on site	47-indicator checklist	IUMSP, ISPM
	Assess GD data quality, following IARC's protocol [8]	R and STATA – classical statistical software	IUMSP

** available in German, French and Italian.*

FSO: Federal Statistical Office
IUMSP: Institute of Social and Preventive Medicine, Lausanne.
FSVO/FOPH: Food Safety division of the Federal Office of Public Health
ISPM: Institute of Social and Preventive Medicine, Bern
BUAS: Bern University of Applied Sciences
IARC: International Agency for Research on Cancer (WHO), Lyon, France.

Food consumption

Following European guidelines [4], food consumption information was collected through two non-consecutive 24HDR. All consumed foods and beverages were recorded using a computerized 24HDR program (multiple-pass approach). The software, called GloboDiet® (GD, formerly EPIC-Soft®), had been developed and validated by the International Agency for Research on Cancer (IARC), Lyon, France [7–10]. For menuCH, the software had been adapted to comply with the Swiss specific food market and specific national requirements defined by FSVO/FOPH, research and public health actors. It was provided in German, French and Italian. The GD software was complemented with a comprehensive menuCH Swiss picture book [11]. It was adapted by FSVO/FOPH from the EPIC-Soft picture book [14] to meet Swiss requirements and thus support survey participants in quantifying amounts of consumed

foods [12, 13]. The picture book comprised 119 series of graduated portion-size pictures of common food items, of which 49 (41%) displayed typical Swiss foods such as *Roesti, Birchermuesli, and Raclette cheese*. In addition, real-size two-dimensional drawings of geometrical models (circles, wedges) as well as standard bread and cake shapes were displayed combined with a thickness scale. Twelve picture series of different household measures (glasses, cups, bowls, ladles, etc.) completed the picture book to estimate portion size. A set of about 60 real dishes was on display in all study centers.

Anthropometry

Body weight and height were measured to the nearest 0.1 kg and cm, respectively following WHO guidelines [15] using a calibrated Seca 701 scale, equipped with a Seca 220 telescopic measuring rod (Seca GmbH, Hamburg, Germany). Mean waist and hip circumferences were calculated out of three measures [15] to the nearest 0.5 cm using a Gulick I unstretchable tape, equipped with a dynamometer (North Coast Medical, CA, USA). In pregnant and lactating women only height was measured. Field dietitians controlled daily the functionality of all instruments prior to use. Data were entered in a centrally managed secured web-based database.

Dietary behavior and physical activity questionnaire

Participants completed a pre-tested self-administered 49-item paper questionnaire, compiled by FSVO / FOPH from existing and newly developed questions. It included questions about cooking and eating habits, nutrition knowledge, and physical activity (short form IPAQ [16–18]), complemented with a set of questions about socioeconomic and demographic characteristics. The questionnaire was returned in person, controlled during the face-to-face interview and data entered in a centrally managed secured web-based database after interview closure.

Quality control concept

Quality control at all stages of a survey is crucial for high data quality [19–21]. A quality control concept was established and tested, covering the period before, during and after data collection.

Before data collection – Training

Recruitment interviewers and field dietitians were separately trained in June / July 2013. The director of the CATI-laboratory trained during at least two half days and supervised three recruiters covering the three survey languages plus English. The focus was on communication with concurrent use of the CATI-system and the scheduling tool software, followed by practice calls with specifically instructed volunteers. In parallel, the field dietitians (two per linguistic region) were trained by the survey coordinators during the three-step training program. Firstly, during a 3.5 day central baseline training, field dietitians were informed about the survey specific standard operating procedures (SOP) and intensively trained to perform 24HDR using GD following IARC training standards [22], take anthropometric measures, check the dietary behavior and physical activity questionnaire for completeness and get accustomed with data entry and management. Secondly, dietitians conducted at least five face-to-face and phone interviews each with fake participants at their local study center. These volunteers had been recruited as described above as part of the recruiters' training. Interviews were supervised by two regional coordinators. Thirdly, a 1.5 day central consolidation training was held: field dietitians were tested by survey investigators and coordinators for their competencies to conduct standardized interviews in their local language with invited volunteers. Field dietitians completed an evaluation form after baseline and consolidation training. They were asked to evaluate received information (e.g. '*I feel well informed about ...*') and their use of survey tools (e.g. '*I feel ready to perform ...*') on a six-point rating scale, indicate graphically their satisfaction with the training format / method and content, and provide any suggestions.

During data collection – Field work quality control

On-site quality controls were performed using an internally developed 47-indicator checklist to rate (++ / + / - / --) field dietitians' interview and work quality. Checklist indicators were based on survey specific SOP, including anthropometry (e.g. implementation of the single measurements in compliance with protocol, error-free data entry), IARC's international recommendations about how to conduct a 24HDR [22], an existing tool [23] and literature [20, 24]. The quality control checklist was completed by coordinators while attending interviews at the study centers and was followed by a personal evaluation with the field dietician.

Field dietitians reviewed their daily work in keeping electronic logbooks and informed coordinators every two weeks about questions or issues raised during field work and potentially influencing data quality. Logbooks concerned the overall survey organization including data trans-

fer / management issues, the GD software (e.g. description of complex foods, calculation of portion size from food dimensions, new foods and recipes), the picture book, the household measures (e.g. desirable new food pictures or bread shapes), the dietary behavior and physical activity questionnaire and its data entry, and the scheduling tool. Investigators, supported by FSVO / FOPH, merged and evaluated all incoming thematic logbooks and provided standardized written answers / solutions to the entire survey team for subsequent implementation.

After data collection –
Central data collection quality control

The 24HDR data collection quality was evaluated using mostly the criteria / indicators recommended by IARC [8]: number of Food Consumption Occasions (FCO, i.e. meals and snacks) and foods reported per recall; consumed quantity of 18 food groups per recall; recall duration; number of recalls by week-day; use frequency of pre-coded generic food items (e.g. berries, not specified), unknown and non-specified descriptors (e.g. cooked with fat, not specified); outliers in energy intake to identify typing errors in portion size entry or incomplete 24HDR interviews (very low: <1000 kcal / day and very high: >4000 kcal / day). Data from the dietary behavior and physical activity questionnaire and anthropometric measurements were analyzed for inconsistencies, unexpected results compared to literature, and missing values.

Data management, cleaning and analysis

Data from the dietary behavior and physical activity questionnaire and anthropometric measures were directly entered and managed in a central web-based Sphinx© database (Sphinx Development, London, UK). GD files stored at study centers were transferred on a weekly basis to the secured centralized database at IUMSP. For safety reasons, field dietitians also made a daily back-up on a password protected USB stick. After central GD data quality control, a specifically trained dietitian (data cleaner) prioritized the cleaning of dietitians' notes following IARC internal recommendations, and established on this basis a standardized GD data cleaning protocol. New foods and recipes, that could not be selected from the given GD food and recipe lists, could thus be identified and reported to FSVO / FOPH for updating GD prior to the main survey.

GD data analysis was restricted to food level. It primarily aimed at supporting data cleaning by analyzing the number and types of notes taken during dietary interviews, and assessing variability within 24HDR by interview administration mode and across dietitians for quality control purposes. Descriptive statistics, without adjustments or weighting factors, were applied. Categorical data are presented as absolute or relative frequencies. Continuous data are presented as mean ± standard deviation when distribution tended to be normal, or with box-plots when skewed. Group comparisons were performed using chi-square or two-sample t test (two-sided significance set at $p < 0.05$).

Ethical issues

The pilot survey protocol was approved by the three cantonal ethics committees of Vaud (lead committee, Protocol 26 / 13, accepted on Feb 21st 2013), Bern and Ticino.

Results

Sampling and participation

For 1310 out of 2016 address data sets (65%), a landline phone number was provided. This rate was lower in the French and Italian parts, but could be slightly complemented with 383 returned response cards. Still, for 47% of the gross sample no contact was possible (Figure 1). Overall, 276 people took part in the pilot survey which corresponded to 13.7% gross and 28.8% net participation rates. Net participation rate among people with response card was 70%. Six people dropped out before the second interview. The remaining 270 participants had complete dataset: i.e., two 24HDR, a complete dietary behavior and physical activity questionnaire, and all anthropometric measures. Uniform distribution of 24HDR across all week-days was not fully achieved (Figure 2). Recalls assessing food consumption at the end of the week were less frequent than recalls reporting diet from Monday to Wednesday. This was especially the case for phone interviews. Out of 684 people who refused participation, 337 (49%) accepted to answer the non-respondent questionnaire (Figure 1). They stated lack of time (55%) and no interest (26%) as the main reasons for refusal. Twenty-five percent of refusals reported being regular smokers. Table 2 shows that pilot survey participants and non-participants (i.e. non-responders, ineligible and never phone-contacted people) were similar regarding age (48.7 ± 15.5 vs. 47.0 ± 15.6 years) and gender proportion (49.6% vs. 49.8% of women). However, significantly more Swiss than non-Swiss accepted to participate ($p < 0.001$). The prevalence of overweight and obesity in pilot survey participants was respectively 36% and 15% and smoking rate 25%.

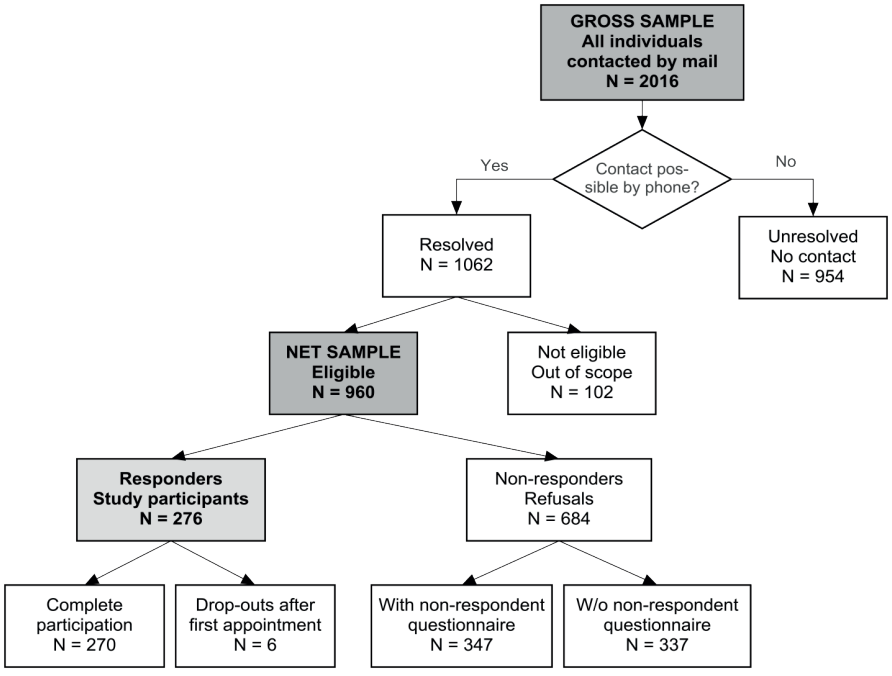

Figure 1. Participation classification, following 2014 European Food Safety Authority's classification recommendations [35]. Complete participation implies the entire dataset is available: two 24HDR, a complete dietary behavior and physical activity questionnaire, and all anthropometric measures.

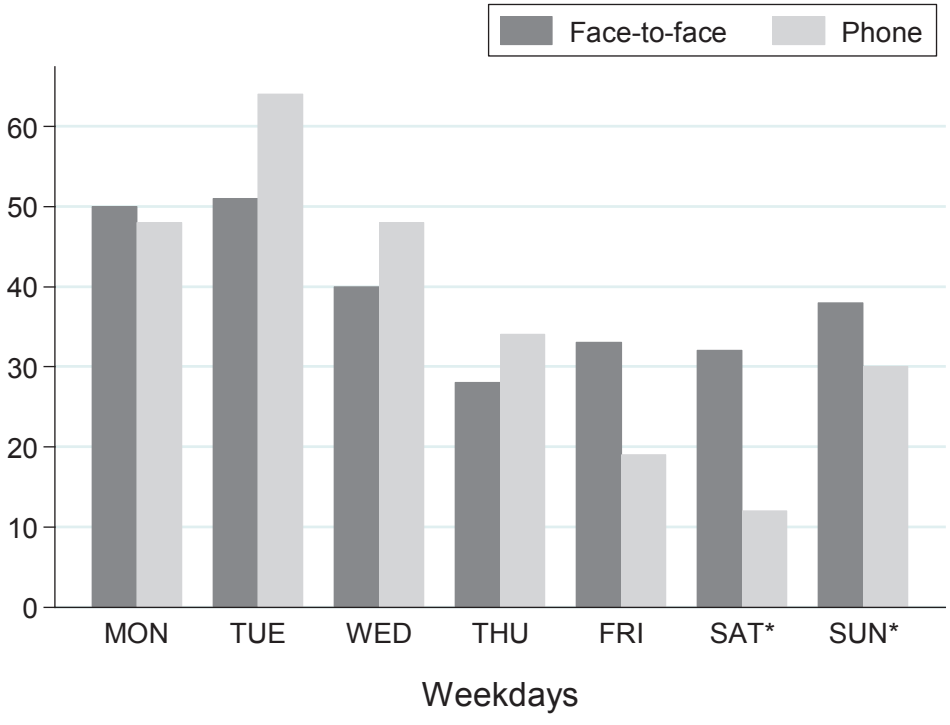

Figure 2. Distribution of the 24HDR interviews (n=527) over week-days per recall day, and by administration mode (face-to-face vs. phone). Appointments (interview days) were possible from Mondays to Saturdays. *Participants interviewed on Mondays having an odd identification code were asked to report their dietary intake from Sunday, respectively from Saturday when even.

Table 2. Characteristics of selected people from gross sample and by participation status (data provided by Federal Statistical Office, Switzerland, 2013).

Characteristics	Gross sample	Participants	Non-participants	P-value*
		N (%) or mean (±SD)		
Sample size	2016 (100.0)	276 (13.7)	1740 (86.3)	
Sex				0.967
Men	1013 (50.3)	139 (50.4)	874 (50.2)	
Women	1003 (49.8)	137 (49.6)	866 (49.8)	
Age	47.2 (±15.6)	48.7 (±15.5)	47.0 (±15.6)	0.092
Communication language				0.300
German	638 (31.7)	97 (35.1)	541 (31.1)	
French	701 (34.8)	96 (34.8)	605 (34.8)	
Italian	677 (33.6)	83 (30.1)	594 (34.1)	
Marital status				0.062
Single	599 (29.7)	87 (31.5)	512 (29.4)	
Married	1135 (56.3)	163 (59.1)	972 (55.9)	
Widowed - Divorced	282 (14.0)	26 (9.4)	256 (14.7)	
Household size				0.048
1 person	325 (16.1)	35 (12.7)	290 (16.7)	
2 people	690 (34.2)	106 (38.4)	584 (33.6)	
3 people	396 (19.6)	42 (15.2)	354 (20.3)	
4 people	384 (19.1)	63 (22.8)	321 (18.5)	
5 or more	221 (11.0)	30 (10.9)	191 (11.0)	
Nationality				<0.001
Swiss	1538 (76.3)	247 (89.5)	1291 (74.2)	
Non-Swiss	478 (23.7)	29 (10.5)	449 (25.8)	

* Between the two groups (participants vs. non-participants) using chi-square tests, respectively two-sample t test for age.

Data collection procedures and instruments

The structure and allocated time per appointment was considered as sufficient by field dietitians and coordinators, except if recruiters and field dietitians had to book all available time slots of a day for face-to-face and phone interviews, allowing for no rest periods. The median duration of the 24HDR was slightly shorter than the expected minimum duration of 40 minutes: 37 minutes (P25: 29 minutes and P75: 48). Face-to-face 24HDR lasted for 39 minutes (39, 37 and 38 minutes in the German, French and Italian areas, respectively) whereas 35 minutes was needed for phone 24HDR (respectively 39, 33 and 36 minutes).

No technical problems occurred with any of the applied devices or IT-solutions. Logbook entries related to GD-software and subsequent evaluation of notes served to identify 36 typing errors and imprecisions in food and recipe names; 65 new foods and 27 new recipes were added in the food / recipe lists. A few new recipes (n = 4) were considered as international or nationally available, but most were added at the request of German, French and Italian speaking dietitians (9, 6, and 8, respectively). The dietary behavior and physical activity questionnaire was generally completed in comprehensive and correct ways, and field dietitians properly identified and clarified participants' missing or inappropriate answers.

Quality control concept

The quality control concept proved reliable and useful to detect shortcomings and inform improvements for the main survey, also in quality control instruments.

Before data collection – Training

The main challenge for recruiters was the simultaneous use of the CATI-system to manage recruitment and the scheduling tool to set up appointments with dietitians. Oral and written evaluation showed that field dietitians' training was appropriate to allow conducting real-life interviews. They felt very well informed and ready to collect data after the consolidation training. All rated themselves between 1 and 2 out of 6, 1 being the best grade and 6 the worst. Learning and concurrent use of different software applications and associated materials during recruitment/interview situations was experienced challenging and training-intensive. Time for in-depth (self-) reflection and feedback was short.

During data collection – Field work quality control

Regional coordinators visited each field dietitian at least twice during the 4-month data collection; they attended 21 interviews (4%) applying the quality control checklist. Checklist analyses showed that all field dietitians followed the defined interview structure and SOP. Even though standardization of anthropometric measurements (e.g. precision for waist circumference) and GD data entry regarding complex foods or recipes was challenging, no indicators were rated as insufficient by coordinators. Comparison between regional coordinators showed that both jointly attended interviews were rated very similarly but the interpretation of '++' vs. '+' in the four-point rating scale (++ / + / - / - -) slightly differed between coordinators. The rating was subsequently reduced to a concrete three-point scale of 'adequate/acceptable/insufficient'. Further, separate checklists for the more extensive face-to-face and shorter phone interview were prepared (available on request). Electronic logbooks were submitted and evaluated as planned. Number of entries reduced over time for all issues in every linguistic region but those concerning the 24HDR using GD. The standardized description of certain foods and recipes challenged dietitians due to different possibilities to interpret some facets (e.g. '*After which level of preparation a commercial food becomes a homemade preparation?*'). The data cleaner established a common question and answer document (in English) with additional separate sections for language-specific matters. It was continuously updated in cooperation with FSVO/FOPH and sent to field dietitians as a reference to complement the GD manual for the main survey.

After data collection – Central data collection quality control

Evaluation of 24HDR quality at food level showed that data collection was similar across dietitians, centers and independent of the administration mode. The total number of conducted interviews per dietitian varied between 71 and 112. The median number of FCO (i.e. meals and snacks) and of reported foods per recall day were similar across dietitians and between face-to-face and phone interviews (Figure 3). For the 18 food groups predefined by GD, the median consumption per 24HDR was comparable between face-to-face and phone interviews (data not shown). On average, 3.5 pre-coded generic food items were used per recall, i.e. 15% of all food items reported

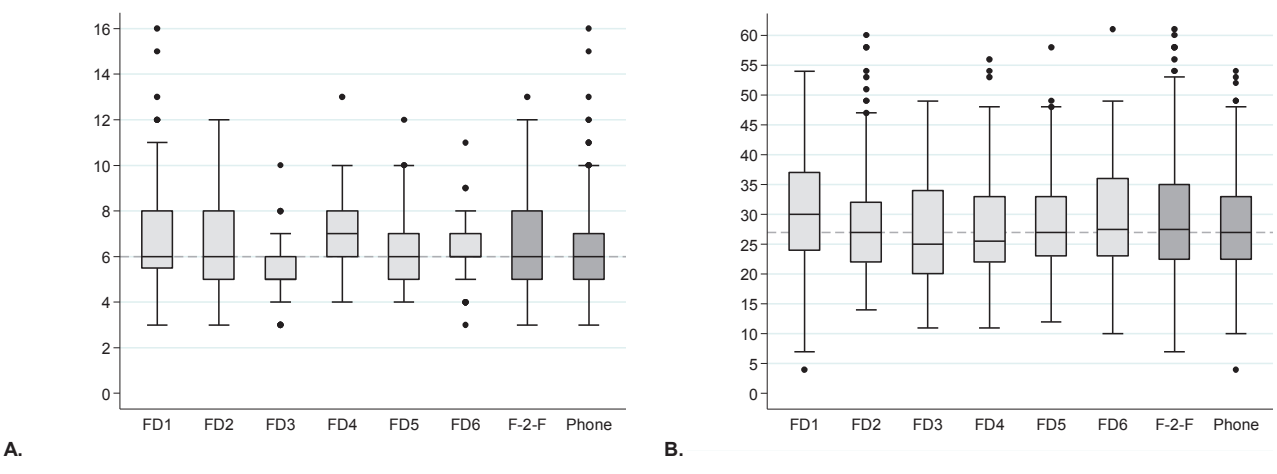

Figure 3. Number of reported Food Consumption Occasions (FCO, i.e. meals and snacks) (A) and number of consumed food items per 24HDR (B) by field dietitian (FD) and, in darker grey, by administration mode (face-to-face vs. phone). The horizontal dashed line shows the median considering all 24HDR interviews.

(17% in the German and French-speaking parts, and 12% in the Italian). No major differences were seen between face-to-face (3.6 items per recall) and phone (3.4) 24HDR. The pre-coded unknown or non-specified descriptors for food and recipe facets were seldom used: 8% and 9% of all descriptors, respectively. No differences were observed between linguistic regions and administration mode. Outliers in energy intake (n=29 low and n=13 high intakes) could often be explained by consulting indications concerning special days (e.g. being sick or feast day) and diets (e.g. weight management).

Data management and cleaning

The established data management structure was step-wise refined during pilot survey. The management of the complex GD file transfer needed particular attention. Field dietitians requested additional support in proper implementation. The procedure to back-up, transfer and centrally store GD files was revised immediately after identification of a problem that caused the loss of 19 24HDR files. GD file evaluation and data cleaning procedures were clarified and related workload estimated. The cleaning of 527 pilot 24HDR implied checking and cleaning 660 notes from field dietitians plus 1221 notes automatically generated by GD (3.6 notes per 24HDR). About 10 minutes were needed to clean a single 24HDR. Time spent to clean notes was directly related to their quality. The cleaning was finalized in parallel to the main survey phase.

Discussion

The present pilot survey tested the feasibility of the nutrition survey implementation concept based on the given specifications by the open call of tenders. The overall implementation concept was feasible in terms of sampling, participants' recruitment, data collection in three languages, standard operating and quality control procedures. Basic data management structures and data cleaning procedures were tested. Descriptive data analysis served quality control purposes only. The pilot survey highlighted details that needed improvement for the larger scale main survey that started in December 2013.

Sampling and participation

Sampling by the FSO was based on community registry data that are regularly updated. Still, almost half of the sample remained unresolved and were lost to recruitment because no contact was possible (Figure 1). A major limitation was the lack of phone numbers for about one third of the gross sample. The returned response card allowed contacting people without initially provided phone number. However, these people may have been more nutrition and health conscious than the remaining sample and thus may have introduced a selection bias. Still, participants and non-participants did not differ in most selected socio-demographic characteristics. In addition, the prevalence of overweight (36%) and obesity (15%) was comparable to other national surveys. For example, in the 2010–2011 Swiss survey on salt intake, respectively 32% and 13% were overweight and obese [25]. Based on self-reported weight and height, 41% of participants in the 2012 Swiss Health Survey were considered overweight or obese (BMI ≥ 25 kg/m^2) [26].

A gross participation rate of 14% was achieved compared to the expected 25%. The latter was based on reports from other European surveys [5, 6, 27, 28] and the Swiss Health Surveys 2007 (66%) [29] and 2012 (54%) [26], both phone-administrated. However, comparability of response rates is limited due to differences in sampling strategies across Europe (community registry vs. phone registry), the way of expressing / calculating response rates, and the applied interview administration mode (face-to-face vs. phone). Other factors may be the population's appreciation of the survey topic (nutrition vs. general health) and a seasonal effect. The present pilot survey was conducted in summer and fall, both typical Swiss vacation periods. Furthermore, the need for two appointments, of which one required dislocation to a study center, was a probable reason for refusal. Compensation payment could cover travel costs but not entirely time investment. It was not experienced as a decisive leverage by recruiters.

Recruiters were well trained but it was difficult to anticipate the full range of reactions of a population sample invited to participate in a first national nutrition survey. With time, recruiters refined strategies to convince participants and recruitment became increasingly successful. However, the main reasons for refusal, i.e. lack of time and interest, were still difficult to overcome. In this view, an improved practice-informed peer-supported recruiter training for the main survey was elaborated to benefit from the lessons learnt during the pilot survey. The observed distribution of interviews across week-days reflected a combination of responders' favorite availabilities, study centers' opening hours and conflicting bookings by recruiters (face-to-face)

and field dietitians (phone). This is a known phenomenon in food consumption surveys and is making application of statistical weighting strategies necessary [5, 30–32].

Based on these experiences, the gross sample for the main survey was corrected upwards in order to reach the target sample size of 2000 participants across Switzerland in 12 months. The invitation letter with response card was kept unchanged. Additional resources were allocated to the recruitment center, which was the key step to reach the anticipated 25% gross participation rate and de facto maximize representativeness of the main survey participants. A monthly lottery (CHF 300) was also introduced to boost motivation for participation. The scheduling tool was improved to gain time at recruitment, survey coordination and field dietitian levels.

Data collection procedures and instruments

Data collection procedures could be implemented as planned. Offering responders a choice of interview dates and time slots required sufficient presence and flexibility of field dietitians. Based on the pilot experience, it was decided to plan five interviews per eight hour working day. The available time per appointment was extended by 15 minutes for both face-to-face and phone interviews to ensure enough time for preparatory and follow-up work as well as regulated work breaks, independent of booking status.

Quality control concept

The multilevel quality control concept was successfully implemented and resulted in some changes in the field dietitians training and supervision. The three-part training of field dietitians was sufficient to guarantee good to high quality face-to-face and phone interviews. However, training evaluation results and repeated on-site quality controls highlighted the need for better standardization of anthropometric measures, as reported for other health professionals [33]. Additionally, 24HDR related information and question-answer sessions were recognized to be a key issue requesting more time. Consequently, for the main survey the training was extended to 4.5 days for baseline and two days for consolidation. The field dietitians' logbook entries and newly established 24HDR's question and answer document showed that food consumption across Switzerland varies and will require continuous extension of the trilingual Swiss version of GD. More structured guidance on when a specific note was needed and which information should be included was necessary. Individual feedback regarding notes was also asked by dietitians. Thus, the main survey training concept and material were adapted to consider more realistic cases and integrate pilot field dietitians as peer-co-trainers.

Central data collection quality control showed that the trilingual Swiss GD software application provided reasonable and comparable results at food level, across dietitians and administration mode. Changes in GD, namely addition of new foods and recipes as well as correction of errors were expected [7], but their implementation by FSVO/FOPH and IARC was more time consuming than usual because of the three languages. Availability of an updated Swiss version of GD was thus slightly delayed, without hampering preparation and start of the main survey. Finally, an international group of experts in dietary assessment methods and nutrition surveys from Germany, France and the Netherlands, IARC, FSO, and the menuCH team was established to discuss data handling and analyses in the main survey.

Data management and cleaning

The experiences gained by the pilot survey allowed a practice-based time estimate for the cleaning of 4000 24HDR planned for the main survey, considering IARC's recommendations on note prioritization and defined the need for additional human resources. GD file management was improved by introducing additional backup strategies. Original 24HDR files had to be kept secured until the end of the survey at three levels: the field dietitian that conducted the interview, the senior dietitian responsible for data cleaning and at the central data management center.

Strengths and limitations

Overall, the pilot survey implementation concept of the first national nutrition survey in Switzerland proved applicable. A direct comparison with other national surveys is difficult, since to our knowledge no other country published in peer-reviewed journals information about their pilot national nutrition survey. As Switzerland is characterized by three linguistic regions, where dietary patterns are expected to differ, a representative nutrition survey of the Swiss population thus required a complex structure and logistic organization, which we could pilot only in limited ways.

First, the pilot survey was restricted to three cantons. However, despite a slightly different sampling frame the limitations of the community-registry sample data were recognized and measures were taken to increase participation in the main survey. Second, the multilingual approach required personnel with strong language skills. Dietitians had to speak the local language to interview the partici-

pants plus English to communicate with the menuCH team. This requirement could only be partially met in the professional group of dietitians and turned overall communication during training and field work difficult and time-consuming. However, the complexity of the dietary assessment requires nutrition professionals, as confirmed by the positive results from the quality controls and also stated earlier [34]. Third, the core instrument, the Swiss adaptation of GD was still under construction when preparing the pilot survey. Fourth, due to timely constraints, investigators only focused on the field test of organization, recruitment and interview methods, operational reliability of instruments including quality control procedures, and the set-up of efficient and secure data management and data cleaning structures. Prior to the main survey, no extensive analyses (e.g. using survey weights) of these pilot survey data were conducted; hence no detailed information on food or nutrient consumption could be provided. Time thus was recognized as the largest limitation, balanced by the strength of an experienced / knowledgeable and efficient investigator team.

Conclusion

The pilot survey was particularly important and valuable to prepare the first trilingual national nutrition survey. It allowed identifying bottlenecks and improving procedures and survey instruments. Investigators could establish an implementation concept complying with the requirements of the FSVO / FOPH and building on international nutrition survey models. The concept's comprehensive pilot application in the specific Swiss context confirmed to be the only mean to realistically estimate the investments and needs at structural, human, timely, communication, instrumental and monetary levels. On this basis the conduct of the main survey applying a tested and slightly amended implementation concept was justified.

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Author's contribution

AC, SBB and MB drafted the manuscript, based on analyses performed by AC and MB. All co-authors critically reviewed the manuscript and approved the final version. AR coordinated the open call for tenders. The survey protocol was prepared by SBB and PMV. ECF and CZ established the trilingual Swiss version of GloboDiet® with the menuCH picture book and helped in project coordination. SB directed the recruitment center and team. SBB, AC, NM, StS, CZ and ECF trained field dietitians. AC, NM, and SBB defined and conducted quality controls. StS carried out GD data cleaning. SBB was responsible for survey implementation. PMV was in charge of data management. MB directed the survey.

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Conflicts of Interest

The authors declare no conflicts of interest.

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